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NAJI ABI-AAD

Assessment Gulf Gas Export to the European Union

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Assessment of Gulf Gas Export to the European Union

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The Gulf (the "Arabian", "Persian" or both!) includes large actual and potential producers of natural gas that can significantly alter the supply and demand picture, both within the region and internationally. A helping factor is the quite huge gas resource base in the area in relation to its actual and foreseeable level of demand. In other words, the Gulf that currently plays only a marginal role on the international gas market, has surely the potential to become a leading user and a world supplier of natural gas.

The spotlight has been focused on the numerous new natural gas export projects in the Gulf, and on the expected increase in the coming years in the region's share of world gas exports. However, in the mean time, an important trend is taking place, consisting of the phenomenal increase in the Gulf's own natural gas consumption beyond the historical flat levels, which is giving rise to numerous gas distribution and consuming projects, and having a growing impact both on the structure of energy demand in that part of the world and on the level of industrial development there.

Natural gas in the Gulf is actually viewed as one component of different strategies that consist of either using it domestically by some countries in order to reduce the local demand for crude oil and petroleum products and release more of them for export, or enhancing its output to increase their share in the global petroleum market and their financial receipts at a time when oil output and revenues are limited and constrained by output quotas and erratic prices. Some other countries are using their modest natural gas reserves to moderate their growing dependence upon liquid petroleum and thus to minimise their fuel imports and increase their energy self-sufficiency.

GAS RESERVES & RESOURCES

Proved natural gas reserves in the main Gulf countries (Iran, Iraq, Oman, Qatar, Saudi Arabia, United Arab Emirates—UAE, and Yemen) were estimated at 51,511 billion cubic metres (Bcm) as at the beginning of 2001, accounting for around 33 per cent of the world total. The 2000 gas proved reserves in the Gulf are alone sufficient, even if no further discoveries are made, to satisfy current worldwide consumption for more than 21 years. The bulk of Gulf gas reserves is concentrated in a small number of giant accumulations. The region has most probably nine supergiant fields (over 1,400 Bcm of proved reserves each), out of twenty of those structures on our planet.

Even though, many believe that natural gas reserves in the Gulf have been underestimated — and underestimated to a large extent. In this context, a comparison of the ratio of crude oil reserves to those of natural gas on a regional basis is very revealing. On an energy-equivalent basis, oil reserves in the Gulf

are more than twice as large as those of gas, the ratio being more than double that of the world as a whole, where oil and gas reserves are roughly equal. The Gulf might be a particularly "oily" province, but should the average global ratio of oil to gas reserves also hold for the region, then the potential for new gas discoveries is indeed vast.

In addition, the ratio of natural gas reserves in associated form (found and produced with crude oil) to non-associated (or free) gas in the Gulf is far higher than in most other regions of the world. Indeed, associated gas reserves in the area represent around 45 per cent of the total, leaving about 55 per cent of non-associated gas, whereas the average world ratio is some 15 per cent and 85 per cent respectively. This indicates that the potential for the discovery of significant volumes of non-associated gas in the region could be high.

Of course, those two ratios by themselves are not considered as sufficient grounds for surely asserting that natural gas reserves in the region are underestimated. However, there are a number of other factors, which suggest that actual reserves may be far greater than presently reported.

In fact, the huge increases of reserves in the Gulf over the last 35 years or so have been mainly the result of development work not of exploration activities. Exploration has become insignificant in the area. Out of some 1,780 active exploration rigs in the world (excluding Eastern Europe) in 1999, about 83 only were doing work in the region, a disproportionately small figure (around 4.7 per cent of the total) in relation to the area's existing petroleum reserve stock and production level, or discovery prospects.

Earlier exploration activities in the Gulf had mostly concentrated on the search for crude oil rather than natural gas and, as a result, gas discoveries had occurred more by chance than by design. In addition, discoveries of natural gas were often not accorded any value, and wells that encountered gas rather than oil were considered dry holes. Moreover, license areas found to contain large quantities of gas but no crude were most of the time relinquished by exploration companies.

Furthermore, gas fields that had been found were often not delineated or fully appraised, with only a preliminary estimate of reserves — if any — being made. There was little incentive to carry out the testing and further drilling necessary to evaluate the gas discovery at a time when natural gas was perceived as having little or no value, being regarded as an unwanted by-product of crude production, vast quantities of which were being flared in oil fields.

Since nearly two decades only have natural gas reserves assumed any great importance, especially in those countries that also happen to have large reserves of crude oil, which is why it is only in recent years that exploration specifically targeted at discovering gas has been undertaken in many Gulf countries. This effort, although still timid, has involved drilling in previously identified, but unexplored, structures as well as undertaking the drilling of more sophisticated and deep wells. Deep horizons promise to hold more gas reserves than oil, and it is this fact that has discouraged the drilling of expensive deep wells in the past in many countries.

Many believe that a new and systematic review of the real potential of all the structures in the Gulf could spring many positive surprises, especially since the presence of giant and supergiant fields made it unnecessary in the past to mobilise very fine approaches. The proved natural gas reserves (and even those of crude oil) in the region would be therefore much higher when new and improved technologies are applied.

Besides, no serious exhaustive investigation has yet been attempted to identify the satellite accumulations of the main fields discovered in the Gulf. In the North Sea, for example, this type of approach has helped to double the producible reserves. Without drawing a parallel with this region, it is reasonable to assume that this approach should also benefit the Gulf.

As a result of all these factors one can be fairly confident that gas reserves in the Gulf will continue to grow and that the region will account for a far larger share of the world's gas resources. However, considering the enormous potential of the Gulf, so little has been done so far to exploit its gas reserves. The 2000 reserves to production ratio for natural gas in the area (production equals gross production minus reinjection), a measure often used as an indication of near-term supply capability, was relatively very high, covering around 245 years compared to only 61 years world-wide.

In addition to the concept of proved reserves, the undiscovered resources are getting more and more importance. They are defined as the resources of hydrocarbons believed to still exist and to be eventually discovered. This may be regarded as a purely geological concept that is not concerned with technological or economic constraints or with a time scale.

There is only one public source estimating the world's petroleum resources, namely the US Geological Survey (USGS, Ch. Masters and others) that used to publish its figures once every three years. The latest resource figures by the USGS were released in 2000 when it estimated the undiscovered gas

resources of the region at around 35604 Bcm (mean), or 24 per cent of the world total.

GAS DEVELOPMENT, PRODUCTION & USE

Since the mid-1970s, producing countries especially in the Gulf have made considerable strides towards the exploitation of their natural gas reserves, especially the associated ones. A number of important gas projects have subsequently been undertaken or are currently under construction or study.

The development of associated gas reserves was encouraged despite the drawbacks of establishing a gas industry purely on the exploitation of such reserves. In fact, although the gas is freely available, its utilisation does not necessarily involve low costs; indeed associated gas may be economically less attractive than non-associated gas. In particular, associated gas has usually to go through a number of stages of gas/oil separation before it can be used and, consequently, it is only available at very low pressure — often little higher than atmospheric pressure — requiring the installation of compressors for its transmission. Non-associated gas, on the other hand, is generally available at much higher pressures.

Secondly, the rate of production of associated gas is dependent by definition on the rate of oil production, which can lead to great fluctuations in supply. In the case of Gulf OPEC member countries, the drop in their oil output during the first half of the 1980s had led to gas shortages at a time when gas had just become an important domestic fuel and industrial feedstock.

Concerted efforts followed aimed both at the development of known non-associated gas fields and the exploration and discovery of new ones in order to increase the production of dry gas, but these efforts have been hampered by falling revenues from oil exports and a related lack of investment capital.

Moreover, the development of non-associated gas fields in new regions, far from existing customers and therefore involving LNG or long-distance pipeline, is highly capital intensive — much more than the development of oil fields of comparable size. In these circumstances, developing such gas fields cannot be undertaken without the involvement of the gas purchasers. The complete chain of field development, surface facilities, processing plants, pipeline or LNG facilities, must be in place before gas can be produced. This in turn renders development of gas fields a very complicated operation, requiring a huge initial capital outlay before any returns can be earned, in direct contrast to the development of oil fields, where oil can be produced early on from development wells to provide a revenue stream offsetting — at least partially —

the investment expenditure. The provision of enough front-end capital is the main problem and, as is not the case in the development of oil fields, gas consumers often have to participate from the start in the necessary capital investment.

Unsurprisingly, in view of the above, the most significant gas-related developments in the Gulf are taking place in those countries (the UAE, Qatar and Oman) whose petroleum industries have been less politicised and where foreign investment in petroleum projects has not been ruled out. Another conclusion consists to say that major gas development projects in the region will have to be export-oriented if they are to secure external financing.

As a result of the above mentioned-development (associated gas burned at the flare, then recovered and used, and finally the development of dry non-associated gas), marketed natural gas production in the Gulf countries had doubled during the period 1990-2000 from around 105 Bcm to about 210 Bcm, representing 6.3 per cent and 8.7 per cent respectively of the world total. Even though, gas production in the region remains tiny in relation to its reserves. In 2000, those Gulf countries produced only 0.4 per cent of its gas reserves, compared to the world's ratio of 1.6 per cent.

However, most of the gas produced in the region is still in associated form. The gas output is thus linked to that of crude oil, which is not expected to dramatically increase beyond current levels in the foreseeable future. That surely leads to increasing serious constraints on domestic gas flows.

In the meantime, demand for natural gas in the Gulf countries, where much of the primary energy consumption relies on gas, is firmly growing. Natural gas in the region is used in many vital and politically-sensitive applications such as power generation, water desalination, industry and petrochemicals, gas-condensate recycling, oil field uplift, and enhanced recovery.

In fact, the bulk of marketed natural gas production in the Gulf is consumed locally. The domestic demand for natural gas there had increased by 125 per cent between 1990 and 2000 from around 80 Bcm to about 180 Bcm, while the local consumption of oil and petroleum products had increased by around 30 per cent over the same period.

The volume of gas reinjected into oil reservoirs to maintain pressure in old fields (like most of the region's fields) in the countries under study jumped by more than 350 per cent, from around 10 Bcm in 1990 to about 46 Bcm in

2000. The reinjected gas is expected to continue growing together with the ageing of the oil fields and the installation of facilities for enhanced oil recovery.

The factors that have contributed to the extremely rapid development of gas consumption in the Gulf up to now are expected not only to continue but even to gather momentum in the coming years. Those factors are essentially the sharp growth in energy demand in all countries in the region and the policy of substituting gas for oil in domestic energy consumption. Apart from these evident economic merits, the policy of utilising natural gas domestically offers the advantage for the countries of the region of reducing local demand for crude oil, and hence reserving a maximum share of oil production for export.

The growth in gas demand, coupled with supply constraints, is resulting into an increasing gas deficit in most of the region's countries, and a growing potential for gas trade within the area, under which non-associated gas-rich producers would supply countries or regions with shortfalls. That also would lead us to conclude that only the countries in the Gulf with large non-associated reserves (Qatar and Iran) are strong candidates to become large gas exporters (if they are not already !).

GAS EXPORT

While the domestic gas consumption of the Gulf will not match its gas resources in the medium term, only exports to the major consuming zones will allow the full utilisation of its reserves. In the mean time, some countries in the region will need to import natural gas to meet their demand, whereas other countries will acquire gas supplies when acting as intermediary between the gas resources and the gas markets providing an important transit function.

In 2000, the Gulf had a very marginal share (6.4 per cent) in the international gas trade, limited to flow of LNG export from Abu Dhabi, Qatar and Oman to Japan and South Korea (with some spot cargoes to Europe and the US), and minor piped volumes from Oman to Ras Al-Khaimah. Some flows were limited to national trade (from Sharjah to Dubai and to the other northern UAE emirates).

Nevertheless, in the near future, the Gulf would come to play an important role on the world gas market. Indeed, the countries of the region possess very important assets that should contribute to promote the extension of their trade, including an important margin for natural gas exports even with an increase in the domestic consumption, and a relative proximity to Europe and Asia, strengthened by the opening up of East European countries. These assets should

enable the countries of the area to develop intensive trading in two main directions: regional markets, and interregional trade.

Regional markets could lead to the building of gas pipeline networks where rich producers would supply the countries with gas shortfalls. Those would include countries in the East Mediterranean (Jordan, Syria, Lebanon, Israel, and especially Turkey) and in the Gulf, where some countries have huge oil reserves but minor gas reserves, or gas reserves in associated form. Inter-regionally, Gulf gas will find opportunities on the three main markets, the Indian sub-continent, Asia-Pacific, and Europe, which will show growing deficits in the near future.

However, while the importance of gas reserves of the Gulf allows optimistic expectations about the development of gas export projects from the region, many economic and political constraints will have to be overcome before these schemes will see the light. This is especially true for pipeline projects for which economic issues are not the only determining factors. Unfortunately, although a final peace in the Middle East between the Arabs and Israel (if any) will surely shift in the perception of political risk of the area, it will not be able to eliminate all of the factors of conflicts and instability within the producing countries or the transit states, and the interstate rivalries and disputes in the region, which, together with the Arab-Israeli issue, have been behind the shut down of many (oil) export pipelines in the Middle East.

Another crucially important exercise consists to know if the oil producing and exporting countries in the region find a real interest in encouraging the development of natural gas within their territories or in their neighbouring states for export into the world energy markets. The divergence in interests between countries with large crude oil and (associated) gas reserves (Iraq, Kuwait, Saudi Arabia) and those with huge non-associated natural gas resources only should be taken into consideration. In the region, Qatar represents the only country with minor oil reserves, but with large natural gas resources; Iran's natural gas reserves are the second largest in the world, while the country's oil resources are relatively big although produced with the help of secondary and enhanced recovery techniques from ageing and maturing fields. The question is to evaluate the position of neighbouring countries with huge oil resources towards the states that are developing their natural gas reserves, or are planning to do so in the future.

In fact, developing an alternative energy source as important as natural gas could affect the long-term interests of countries with huge oil reserves in the region. Saudi Arabia is a typical example in this case. Indeed, Riyadh has resisted to every scheme for pumping natural gas originating from countries

such as Qatar, Oman, and Yemen through its territories. Because the price of gas is structurally related to that of oil, it has even been thought that the policy of low oil price adopted by some countries is partly aimed at handicapping the development of natural gas.

In another development, there has been a strong although hidden competition between the different gas developers in the region on increasingly difficult export outlets. This is especially true in Asia-Pacific, the main niche for Gulf LNG, whose export projects have been dependent on supplies to only two countries there, namely Japan and South Korea.

Nevertheless, any economic difficulties in Asia-Pacific, like those seen in 1997-99, or any adverse changes affecting the structure of the gas market there (especially the power sector) will have serious implications for existing and planned LNG export projects in the Gulf. In fact, the Asian economic crisis in the late 1990s has revealed fundamental weaknesses in the economies of the region, and major restructuring efforts have been subsequently required to build the basis for a sustained and strong recovery.

Forced to look beyond Japan and South Korea for buyers, the gas producers in the Gulf are faced with a baleful combination of greater competition, shorter contracts, risky markets, lower prices and less creditworthy customers. This is especially true for clients in countries such as India.

Meanwhile, the Gulf has been facing a growing competition from the LNG developers within the Asia-Pacific region itself. That competition is likely to become intense, with the aim to secure the earliest possible place in the area's natural gas market, and with projects trying to avoid being delayed, having also in mind that long distance gas pipelines could eventually start competing with LNG. Many pipeline projects are now either under construction or consideration in the region, and as markets there develop and grow, pipeline imports could become a real competitive threat to LNG.

Another challenge to the Gulf could well come from the recent trend of seriously exploring for natural gas in the Asia-Pacific region. There is a somehow large potential of discovering more resources, which are to add to the proven reserves already found in the area (a total of about 10330 Bcm in late 2000, around 7 per cent of the world total, and a 2000 reserves to production ratio of 39 years). Until recently, the petroleum industry there had never really explored for natural gas as such, the objective has always been oil. Gas reserves have typically been found while looking for oil and developed incidentally. Any new commercial gas discoveries in Asia-Pacific will be immediately considered as candidates for fast development to supply the region's markets. Pakistan could

be seen here as a good example, where increasing gas reserves and production are actually presenting serious challenges for gas import schemes.

Also on the Asia-Pacific scene, natural gas from the Gulf, particularly that in LNG form, will surely continue to face growing competition from oil but especially from coal. The cost of imported coal, on a thermal value basis, is consistently below the price of LNG which is most of the time higher than that of imported oil. Nevertheless, while consumers in Asia-Pacific might be willing to keep paying a "premium" for natural gas in line with growing concerns in the region about the environmental impact of energy production and use, most governments in the area continue to see economic growth as their top priority, and this together with the availability of relatively cheap coal within the region, coupled with clean coal technologies, could limit that "premium", at least in the medium term.

If one or more of those above-mentioned issues came true, Gulf LNG could be "reoriented" towards other markets, especially Europe and the US. The depressive impacts of such a market supply-demand situation on prices, could then "help" the Gulf LNG to acquire a minor but growing share of the European market, especially that such prices, compared to those proposed by other suppliers, have been hindering the strong entering of Gulf LNG into European markets.

It is useful to raise within this context the issue of LNG carriers transiting Egypt's Suez Canal on their way to European markets. In a development related to the gas transit role of the Canal, the Suez Canal Authority recently refused to grant higher discounts than 35 per cent of transit fees to LNG carriers that are going from Qatar (and any other Gulf potential gas exporter) to Europe. That discount has been awarded since late 1997 in a bid to win lucrative Gulf gas export trade and thwart plans for rival pipelines. But it is highly doubtful that this discount policy will continue if Egypt finds that LNG from the Gulf is competing with the export prospects of its own products.

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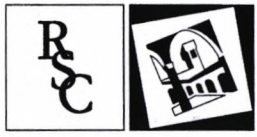

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